

# Modifying the Environment to Reverse Obesity

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There is a growing realization that the changes we have made to our environment over the past several decades have unintentionally facilitated weight gain in the population and contributed to the high rates of obesity currently seen in most countries around the world. Over the centuries, we have shaped our environment to provide us with an increasingly better quality of life, which in part consists of a constant, available, inexpensive food supply and technology to allow us freedom from physical labor. Because the obesity epidemic was an unintended consequence of this shaping of our society in a quest for the “good life,” it likely will be necessary to modify the environment we have created to permanently reduce the prevalence of obesity in the population.

## Our Obesigenic Environment

Surprisingly few studies have been conducted to identify the specific factors in the current environment that facilitate obesity. Despite this lack of research and the absence of any randomized, controlled trials showing how our environment facilitates obesity, many obesity experts believe that our environment promotes weight gain and increases obesity rates in the population. There is no shortage of environmental factors that can encourage overconsumption of food and discourage physical activity. These behaviors create periods of positive energy balance, where over time, energy intake exceeds energy expenditure, which in turn produces the gradual increases in the weight of the population that produced the obesity epidemic. Our current environment has been characterized as one that provides a plentiful supply of inexpensive, high-energy, good-tasting food that is available continuously throughout the day (French et al. 2001; Hill et al. 2003). Similarly,

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our current environment is one in which the need for physical activity has largely been eliminated from the daily lives of most people (French et al. 2001; Hill et al. 2003). Our ancestors had to expend substantial physical effort to secure food and shelter and for transportation. Today, these activities require little physical effort. Most of our leisure time is spent in sedentary pursuits.

### The Built Environment

We can dissect our environment in many ways when it appears to impact obesity. Much recent research has focused on the built environment, which includes how we build our communities and design our buildings, parks, and open spaces. Several studies have shown that how we build our communities can affect our physical activity levels and can even affect obesity (Frank et al. 2004; Saelens et al. 2003). We have become accustomed to conducting business in our cars, using drive-through windows at restaurants, banks, pharmacies, and dry cleaners. We are now learning that having sidewalks, walking to shops and the workplace, and being less reliant on the automobile are associated with more physical activity and less obesity (Frank et al. 2004).

Researchers are beginning to understand the built environment for food and how it affects energy intake and obesity. This environment includes the numbers and types of grocery stores and restaurants available in a community and the types of foods available there. It includes vending throughout many settings (e.g., schools, work sites) within a community. More research is needed for investigators to understand how the amounts and types of food available in these places affect amounts and types of food consumed by the community.

### The Commercial Environment

In addition to the availability of food and opportunities for physical activity that can affect behavior, so too can the way in which physical activity and foods are marketed to the population. We must consider the impact of the current commercial environment on our eating and physical activity patterns and on obesity levels. Marketing food is big business, and we bombard airways, billboards, and magazines with advertisements for food. Often, foods that are not recommended to be eaten frequently (e.g., snack foods) are marketed much more heavily than foods recommended to be frequently consumed (e.g., fruits and vegetables). There is probably a stronger biological preference for the former than for the latter, but what is the role of marketing in consumption of these foods? Unfortunately, almost no research has been conducted to answer this question. Further, a great deal of food marketing is directed toward children; popular cartoon and movie characters are often used to advertise foods not recommended for frequent consumption. We have even allowed food marketing into our schools through vending and, in some cases, through out-sourcing to popular restaurant chains. Many public health advocates point to food advertising, especially food advertising to children, as one of the environmental factors most responsible for the obesity epidemic. Unfortunately, few studies have been conducted in this area, and no clear evidence exists that these foods do in fact contribute to obesity. Although such evidence is much needed, it is likely that the commercial food environment is having some negative impact on food consumption and obesity.

Although most attention has focused on the commercial environment for food, there is also a commercial environment for physical activity, or rather, for physical inactivity. Very few Americans spend much of their leisure time being physically active (Barnes and Schoenborn 2003). This is partly because of the availability of a wide variety of sedentary entertainment pursuits such as televisions, computers, digital video discs (DVDs), and movies. All these products are heavily advertised, and the commercial environment for physical inactivity may be as powerful as the commercial environment for food in facilitating weight gain. Advertisements for computers, big-screen televisions, DVDs, video games, and automobiles also bombard airways, billboards, and magazines.

Briefly, our commercial environment consists of persuading us to eat more food and to be less physically active. In this sense, we are advertising what we value most—a constant supply of good-tasting food, reduced physical labor, and sedentary pursuits for all our leisure time. However, lest we begin thinking that this is the sole factor contributing to the obesity epidemic in humans, our pets are also fat. Who is advertising and marketing to our dogs and cats? It is tempting to attribute obesity largely to a single environmental factor, but the issue is much more complex. Although food and physical inactivity advertising may be factors that contribute to weight gain, it is unlikely that eliminating this type of advertising alone would have a significant impact on the prevalence of obesity.

## The Policy Environment

Another aspect of our environment that possibly contributes to obesity is our policy environment. What are the policies that affect our food supply and eating behaviors? What are the policies that affect our opportunities for physical activity and have allowed the growth of the physical inactivity industry? What are the policies that affect how we deal with obesity in the health care arena? One example of how policy has affected food intake is the supersized extra-value meal that represents a culmination of what we have tried to achieve over generations in our food policies. We have a biological preference for sugar and fat, and our food policies are constructed to provide the food we like at the lowest possible prices. Sugar and fat are inexpensive. Because the costs of these commodities are low,

fast food restaurants can offer foods high in sugar or high in fat at very low costs. Because all restaurants can do this, surviving in a competitive environment required fast-food restaurants to develop new ideas for maintaining loyalty and securing new customers. The value meal could be offered even more cheaply when restaurants packaged together items commonly purchased, such as french fries with a hamburger and soft drink. A later innovation was to supersize these because the incremental costs were minimal, as the ingredients were so inexpensive. Now the consumer believes the supersized value meal is a good “deal” because of much perceived value for very little cost. It will be difficult to take away that deal unless we replace it with a different deal. This means redefining the value when related to providing food. Are there policy options for doing this?

We must examine the policies on physical activity, such as those that make Americans so reliant on the automobile for transportation, which in turn likely contributes to declining physical activity in the population. For example, policies that maintain relatively low costs for gasoline, especially in the United States, are relevant. It is important to understand how these policies ultimately affect our eating and physical activity patterns so that we might use policy changes to modify our food and physical activity environments.

## The Social/Cultural Environment

At the heart of the issue may be our social-cultural environment. This is where our deep-rooted beliefs lie and where we develop the will for political change. Our social-cultural environment can be epitomized by Wal-Mart’s stated motto: “we sell for less.” We are a consumer-oriented society. We want many material goods for the absolute lowest possible prices, and we want them now. We are a society that uses credit liberally. Why not get the newest and latest now? We can pay for it later. This mindset explains why we have difficulty in convincing people to invest in their future by making lifestyle changes today that will not pay off until decades later.

We are a consumer-driven society, and we are all geared toward growing our economy. Democrats and Republicans alike agree on this goal. The goal of all companies is to increase their stock price, and to do this they have to sell more of their products or services. In order to grow, the food industries must sell more

food, and the physical inactivity industries must sell more items that reduce our physical activity. There seems to be no end to the need for growth.

Robert Reich, former U.S. Secretary of Labor, in his book *The Future of Success* (Reich 2001) writes,

judges, legislators, editorial writers, and average citizens alike typically form their opinions on the basis of what alternative best promotes economic growth or best advances the well-being of consumers by lowering prices and generating better products.

He also writes, “In short, the culprit isn’t out there. . . It’s in *here* . . . in our own appetites, in what we want to buy, in the great deals we want to get.”

## The Perfect Storm

We have unintentionally created the “perfect storm” for obesity. We have constructed an environment that is a perfect complement for our biology—if the goal is to produce weight gain. Our biology has evolved to the point that we eat when food is available and rest when we do not have to be physically active. We have created an environment in which food is inexpensive, readily available, served in large portions, and heavily advertised. This environment has eliminated the need for physical activity in our jobs and our schools and provides us with engaging ways to spend our leisure time being sedentary. Sedentary activities are heavily promoted. Our food and physical activity policies support high energy intake and low physical activity. Our cultural values have allowed supersizing to become popular. In essence, we have achieved the “good life” that our ancestors were constantly seeking. Obesity is an unintended and unanticipated consequence of attaining the good life.

## Fixing the Environment

If our environment is the problem, or at least part of the problem, how do we change it to one in which obesity rates are low? We likely will not relinquish much of the good life that we have worked so hard to achieve and return to the environments of our ancestors. At first glance, the issue of change seems difficult if not impossible. The obesity epidemic did not arise from one or two big environmental changes but rather from many small, gradual changes in the environment. We probably will not solve the problem by changing one or two aspects of the environment but possibly by making many small changes. In many ways we have succeeded

in creating the environment we always desired. Now that we realize this environment encourages obesity, the question is whether we can modify it sufficiently to solve our obesity problem while retaining the many things we have worked so hard to achieve.

Several important questions arise in addressing the problem of our environment and obesity. First, do we have compelling reasons and the will to change our environment? Even though public awareness of obesity is high and most people recognize the negative health consequences of obesity, it is not clear that we have a collective will to change the built, commercial, policy, or social-cultural environments. Second, can we feasibly envision an environment that supports low obesity rates? If we cannot imagine this environment, it is unlikely that we can create it.

## What Should Our Environment Look Like?

In the remainder of this essay, we provide our vision of the elements of an environment that would support low rates of obesity and discuss how we might make this vision a reality. What characteristics of the built environment influence obesity? How can we begin to change the built environment to increase physical activity, improve dietary patterns, and reduce obesity? Is it possible to change the marketplace to promote healthy rather than unhealthy eating and to promote physical activity rather than physical inactivity? If our current policies promote obesity, how can we change them? Finally, how do we change our social-cultural environment that sustains the very environment that has created the epidemic of obesity?

## The Built Environment of the Future

It is easiest to think about specific changes in the built environment that could facilitate physical activity. Research shows that people living in mixed use communities with traditional grid designs and with sidewalks and bike paths are more physically active than those living in typical “urban sprawl” communities (Saelens et al. 2003). In many of these mixed communities, walking is an efficient mode of transportation for getting to shopping, schools, and other community destinations. Many such new communities are being built, and it will be important to study these, both to understand the specific characteristics of the built environment that affect physical activity



and to document the long-term impact on physical activity and obesity.

Far less attention has been focused on the nutrition environment within communities. Can we begin to address the built environment for food as we do physical activity? Our vision of the built environment for food involves places we would eat or obtain food, such as restaurants, vending, grocery stores, and convenience stores. We must understand how the numbers and types of food establishments in an individual's environment affect food intake. How much does food availability affect food intake? An example of this is that both the number of grocery stores available and the types of food available in grocery stores vary between neighborhoods and could affect food intake differently in different neighborhoods.

If our food environments are currently encouraging unhealthy eating, how might they be changed to facilitate healthier eating? This could begin with food manufacturers that could modify the food supply so that overconsumption is reduced. Research has identified several characteristics of our food supply that affect how much food is consumed. People tend to consume more food when it is high in fat or energy density (Rolls and Bell 1998; Stubbs et al. 1995). Similarly, more food is consumed when food is served in larger portions (Kral et al. 2004). Efforts to change the food supply to reduce the fat content and energy density and to lower serving sizes could have a positive impact on obesity. But, how do we convince the consumer this is a good value? Will consumers pay relatively more for less even if they know it is in their own best health interest? For example, are there ways to increase the value of smaller food portions?

Similarly, restaurants could help consumers by providing choices that would include not only healthier alternatives but also information that would allow informed choices and even incentives for choosing the healthier alternatives. As a beginning, restaurants regardless of type could offer better choices on the menu and tips for modifying existing choices to make them healthier or lower in calories.

Vending machines are a large part of the built environment and are often filled only with food choices that most experts would recommend not be consumed frequently. It is certainly reasonable to expect to have healthier choices in vending machines. How can this occur and are such changes economically sustainable?

## The Future Commercial Environment

Can we envision a future commercial environment in which the healthier foods are marketed with the same intensity as some of the less-healthy foods? There is certainly an innate preference for foods high in sugar and fat, and it is unlikely that fruits and vegetables can be made as popular as some of the high-sugar, high-fat foods. However, we could use the same strategies to market the better foods, including advertisements linking these foods with popular movie and cartoon characters.

Many critics of the food industry focus on how foods are marketed to children. It is common for the foods advertised on children's television shows to be high in sugar and/or fat. Although there is no scientific evidence that this advertising leads to obesity in children, it is certainly a possible factor and one that could be changed.

However, we also need to examine how the physical inactivity industries market their products to adults and children through advertisements for televisions, DVDs, video games, movies, and other sedentary activities.

Is it feasible to change how food and physical inactivity are marketed, especially to children, so that on one hand nutrition improves and physical activity increases, while on the other, the change is economically viable? Most food manufacturers make a range of products, and it might be feasible for them to market better food choices. It is more difficult to think about how the physical inactivity industries can begin to promote physical activity, but creative solutions are possible if partnerships are created between those industries that promote physical activity and those that do not. For example, it might be possible to offer customers a free pass to a park or a zoo with the rental of five DVDs. Can automobile manufacturers form creative partnerships with companies that promote physical activity such that, for example, purchase of a new car might include a season's pass to a state park or even to a ski resort? One interesting development has been the creation of video games that require physical activity on the part of the player.

## The Policy Environment of the Future

One can envision policies at both the national and local levels that would encourage and support healthier physical activity and nutrition choices. For example, it

seems reasonable that every work site could offer its employees the time, opportunity, and permission for at least 15 min of physical activity during the work day. After all, we spend half our waking hours at work, and federal guidelines recommend 30 min per day of activity. In addition, for those work sites that offer food service, it would be helpful to have policies that require or provide incentives for making healthy food choices available to their employees. Other policies that may be considered for work sites are those that give employees incentives and rewards for improving their health risk profiles through engagement in healthy eating and physical activity behaviors. For example, some work sites have successfully experimented with programs that offer days of paid vacation if employees meet certain simple physical fitness criteria every 6 months. In one place where this was tried, employee absenteeism dropped by more than 50%, which provided a large return on investment for the employer (Cincinnati Inquirer 1999).

Schools are also an attractive target for policy intervention. Because achieving and maintaining body weight is becoming much more of a cognitive activity rather than purely physiological, it will be necessary in the future to ensure our children acquire the knowledge and skills to maintain energy balance at a healthy weight. As in any other subject area, learning about energy balance should be a required part of the curriculum throughout elementary and secondary education. And, of course, acquiring the knowledge and skills is only the beginning. It is necessary to provide children with the opportunity for a significant amount of physical activity during the school day and opportunities to make healthy food choices. For example, children might be provided with the opportunity for at least half the daily recommended activity (60 min) during school time. Because many schools do not require physical education, this could accumulate throughout the day from many innovative programs that build physical activity into the classroom through 10-min bouts of physical activity during learning tasks (e.g., Take 10) and nonclassroom time. Children should also be provided with the opportunity to practice their nutrition knowledge and skills during the school day. Thus, policies could be enacted that ensure that food provided during meals meets dietary guidelines and that a la carte vendors and vending machines offer choices consistent with dietary guidelines.

Communities should require all new building and zoning projects to undergo healthy environment impact assessments to assess the impact of these projects on the public health in terms of the food and physical activity environments within the community. In many cases, it may be possible to support healthy behaviors at no additional cost if it is part of the plan initially (i.e., building sidewalks in new developments).

## The Social–Cultural Environment of the Future

Perhaps the greatest challenge and the greatest opportunity are in reshaping the social–cultural environment to make healthy eating and physical activity behaviors more normative. Currently, few short-term incentives or rewards exist for people to engage in healthy behaviors. Finding the motivation and support for beginning and maintaining healthy behaviors is primarily up to the individual, with little help from the environment. This is difficult given the strong and redundant biological, environmental, and social rewards for eating more and moving less. If we are to overcome these powerful forces pushing in the wrong direction, we must find equally powerful incentives/disincentives for people to make different behavior choices. One promising avenue is to nurture existing social trends supporting healthy behaviors, taking advantage of the strong tendency within individuals to “want to belong.” Past experience shows that people will adopt new behaviors that require some effort if there is a sufficiently strong pressure from their peer group to do so or some other powerful voice in their lives. One example of this was the powerful effect of children in spreading the recycling movement. They learned the importance of recycling to sustaining our small planet; they took this message home and chided their parents if they did not recycle. What parent could explain to their child that not recycling was the right thing to do?

One thing is clear. Given our social and cultural heritage and in our market-driven free-enterprise economy, the solution to the obesity problem will not stem from rejecting our strongly held values of personal liberty and freedom of choice. As a culture we have developed an obsession with the deal. Is it possible to redefine the deal in such a way that people gain better health as an outcome? It is not possible to answer this question yet, partly because we have not made a

concerted effort to link better health behaviors with other aspects of our day-to-day lives so that healthy choices become business as usual. To establish this link will not be easy, but it seems the only way to build and sustain better health behaviors in our consumer society. Making this vision of the future a reality will take cooperation and active collaboration among all segments of society, including media, government, commercial business, local community organizations, and the nonprofit sector. This seems reasonable, as these are the very same interests that have helped shape our environment and social system today.

As one social observer, Walter Lippmann, noted, “We have changed our environment more quickly than we know how to change ourselves” (Putnam 2000). He made this statement in 1915, but it is still true today. Our ability to envision and create new goods and services outpaces our ability to fully understand all the consequences—intended and unintended.

## How to Go from Here to There

Now that we understand how our environmental changes have affected rates of obesity and now that we can envision changes in our environment, how do we begin effecting change? Just as the problem of obesity did not occur overnight, it will not be solved overnight, so we should calibrate our expectations accordingly. Social change is slow, and likely it will be years before we can see measurable progress reversing the obesity epidemic. However, despite the magnitude and complexity of the challenge, we must not abandon hope. There are behaviors we can begin modifying to stem the tide of increasing obesity. Recent data are very promising in suggesting that a small decrease—approximately 100 kcal/day—in the number of calories an individual consumes daily is sufficient to stop weight gain in most people (Wyatt et al. 2004). Such a small lifestyle change is feasible to produce weight loss for most people. For example, America on the Move is a national weight gain prevention program that inspires people to walk more each day and to reduce energy intake by about 100 kcal/day (Partnership to Promote Healthy Eating and Active Living 2005).

The challenge will be to sustain the small lifestyle changes, which requires changing aspects of the environment to facilitate the changes (e.g., building side-walks in communities to encourage walking and

creating lower-calorie foods in restaurants to encourage weight loss), and to provide reinforcements/incentives for continuing these behaviors.

## Partnerships

We currently have many small programs and many groups addressing various aspects of the problem of obesity and the environment. Although these efforts help raise awareness about and combat the problem of obesity, too few of the programs and too few of the groups are linked. Just as multiple mathematical vectors pointing in different directions may add to zero, pointing multiple vectors in the same direction produces a large vector equal to the sum of all the smaller ones. No one group or no one sector can reverse the obesity epidemic. Finding a formula for working together so that we have a common goal and strategies and can share credit will be essential. This may prove to be our biggest challenge.

## The Role of the National Institute of Environmental Health Sciences

Under the leadership of Dr. Ken Olden, the National Institute of Environmental Health Sciences (NIEHS) has taken a lead in promoting much needed interdisciplinary research in this area. Dr. Olden recognized that obesity was an environmental issue and one that fit into the framework of NIEHS. This bold move has energized a community of researchers to form interdisciplinary partnerships to study how the environment affects behavior, weight, and obesity. We now have physiologists, behaviorists, and epidemiologists working with community and transportation planners, builders, developers, and economists studying the link between obesity and how we construct our environment. The NIEHS provides leadership and financial support for this interdisciplinary approach to obesity. For example, the NIEHS under Dr. Olden’s leadership developed a “landmark” request for proposals to study the built environment and obesity (NIEHS 2004) and required interdisciplinary research teams to conduct the research. Additionally, in 2004 the NIEHS organized a well-attended national conference titled “Obesity and the Built Environment” held 24–26 May 2004 in Washington, DC. A second such meeting is planned for 2005. This annual meeting provides a forum for interdisciplinary groups to share information and ideas. The legacy of Ken Olden’s leadership

will likely have far reaching implications and could eventually help in identifying novel environmental solutions to the problem of obesity.

### SUMMARY

We are becoming increasingly aware that the way in which we have constructed the environment we live in has contributed to the growing prevalence of obesity through its effects on energy intake and energy expenditure (physical activity). Addressing the obesity epidemic will most likely mean changing the environment. There are many aspects of the environment that can affect our eating and physical activity patterns including how we build our communities (built environment), how we market food and physical activity or inactivity (commercial environment), our policies affecting food and physical activity (policy environment), and our social and cultural values (social-cultural environment). We must examine how we can change these aspects of our environment to better support and sustain healthy eating and active living. It may be possible to make small changes to each aspect of the environment to help address the problem of obesity. The National Institute of Environmental Health Sciences is taking the lead in facilitating this research.

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### NOTES

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